

WHAT IS CLAIMED IS:

1. An isolated protein construct comprising a pilus protein portion linked to an effector portion wherein said pilus protein portion comprises a single pilus protein, including active fragments thereof, wherein said pilus protein portion is not attached to a bacterial cell and wherein said effector portion does not comprise all or part of either a bacterial pilus-protein or bacterial chaperone.

2. The isolated protein construct of claim 1 wherein said pilus-protein is a protein that in living bacterial cells acts as a substrate for assembly into a bacterial surface structure by the usher-chaperone pathway.

3. The isolated protein construct of claim 1 wherein said pilus-protein is a pilin selected from the group consisting of FimH, FimA, FimG, FimF, PapG, PapA, PapE, PapF, and PapK.

4. The isolated protein construct of claim 1 wherein said pilus-protein is an adhesin selected from the group consisting of FimH and PapG.

5. The isolated protein construct of claim 1 wherein said pilus-protein portion is an active fragment of a pilus-protein.

6. The isolated protein construct of claim 5 wherein said active fragment of a pilus-protein is an N-terminal deleted pilus-protein.

7. The isolated protein construct of claim 2 wherein said pilus-protein portion is an active fragment of a pilus-protein.

8. The isolated protein construct of claim 3 wherein said pilus protein portion is an active fragment of a pilin.

9. The isolated protein construct of claim 1 wherein said pilus protein portion is an active fragment of an adhesin.

10. The isolated protein construct of claim 1 wherein said pilus-protein portion and said effector portion are linked by a donor strand.

11. The isolated protein construct of claim 10 wherein said donor strand is covalently linked to at least one of said pilus-protein portion or said effector portion.

12. The isolated protein construct of claim 11 wherein said donor strand is covalently linked to said pilus-protein portion but not to said effector portion.

13. The isolated protein construct of claim 11 wherein said donor strand is covalently linked to said effector portion but not to said pilus-protein portion.

14. The isolated protein construct of claim 11 wherein said donor strand is covalently linked to both said pilus-protein portion and said effector portion.

15. The isolated protein construct of claim 11 wherein said donor strand is non-covalently linked to said pilus-protein portion and to said effector portion.

16. The isolated protein construct of claim 10 wherein said pilus-protein is a protein that in living bacterial cells acts as a substrate for assembly into a bacterial surface structure by the usher-chaperone pathway.

17. The isolated protein construct of claim 10 wherein said pilus-protein is a pilin selected from the group consisting of FimH, FimA, FimG, FimF, PapG, PapA, PapE, PapF, and PapK.

18. The isolated protein construct of claim 10 wherein said pilus-protein is an adhesin selected from the group consisting of FimH and PapG.

19. The isolated protein construct of claim 10 wherein said pilus-protein portion is an active fragment of a pilus-protein.

20. An antibody specific for the protein construct of claim 1.

21. A process for preparing the protein construct of claim 1 comprising linking a pilus protein moiety, or active fragment moiety thereof, to an effector moiety via a bridging structure comprising a donor strand.

22. The process of claim 21 wherein said donor strand is covalently linked to said pilus-protein or to said active portion of said pilus-protein.

23. The process of claim 21 wherein said donor strand is covalently linked to said effector moiety and non-covalently linked to said pilus protein moiety or active fragment moiety thereof.

24. The process of claim 21 wherein said pilus-protein moiety, or active fragment moiety, is an N-terminal deleted pilus-protein moiety or active fragment moiety.

25. The isolated protein construct of claim 1 wherein said effector portion is an immunoglobulin.

26. The isolated protein construct of claim 25 wherein said immunoglobulin comprises at least one heavy and one light chain variable region of an antibody.

27. The isolated protein construct of claim 25 wherein said immunoglobulin is an antibody.

28. The isolated protein construct of claim 27 wherein said antibody has specificity for at least one antigenic determinant of a microorganism.

5 29. The isolated protein construct of claim 28 wherein said microorganism is selected from the group consisting of viruses, bacteria, fungi and protozoans.

30. The isolated protein construct of claim 29 wherein said microorganism is a bacterium.

10

31. The isolated protein construct of claim 30 wherein said bacterium is *Escherichia coli*.

15 32. A composition comprising the protein construct of claim 25 wherein said protein is suspended in a pharmacologically acceptable carrier.

33. A process for treating a disease comprising administering to a patient so infected a therapeutically effective amount of the composition of claim 32.

20 34. The process of claim 33 wherein said disease is a urinary tract infection.

35. The process of claim 34 wherein said urinary tract infection is caused by a bacterium.

25

36. The process of claim 35 wherein said bacterium is *Escherichia coli*.

37. An isolated protein construct comprising a pilus protein portion linked to an effector portion wherein said pilus protein portion comprises a single pilus protein, including active fragments thereof, wherein said pilus protein portion is not attached to a bacterial cell and wherein said effector portion comprises a

30

pilus-protein, including active fragments thereof, and wherein said protein construct does not comprise a pilus.

38. The isolated protein construct of claim 37 wherein said pilus-protein is
5 a protein that in living bacterial cells acts as a substrate for assembly into a bacterial surface structure by the usher-chaperone pathway.

39. The isolated protein construct of claim 37 wherein said pilus-protein is
a pilin selected from the group consisting of FimH, FimA, FimG, FimF, PapG,
10 PapA, PapE, PapF, and PapK.

40. The isolated protein construct of claim 37 wherein said pilus-protein is
an adhesin selected from the group consisting of FimH and PapG.

41. The isolated protein construct of claim 37 wherein said pilus-protein
15 portion is an active fragment of a pilus-protein.

42. The isolated protein construct of claim 37 wherein said active fragment
of a pilus-protein is an N-terminal deleted pilus-protein.

43. The isolated protein construct of claim 37 wherein said pilus-protein
20 portion comprises FimH and said effector portion comprises a complex of FimG and FimC.

44. The isolated protein construct of claim 37 wherein said pilus-protein
25 portion comprises PapE and said effector portion comprises a complex of PapK and PapD.

45. The isolated protein construct of claim 44 wherein said PapE is N-
terminal deleted PapE.
30

46. The protein construct of claim 37 wherein said pilus protein portion and said effector portion are part of a single polypeptide chain.

5 47. The isolated protein construct of claim 37 wherein said effector portion further comprises a donor strand.

48. A composition comprising a therapeutically effective amount of the protein construct of claim 37 suspended in a pharmacologically acceptable carrier.

10

49. A process for treating or preventing a disease comprising administering to a patient afflicted therewith or at risk thereof a therapeutically effective amount of the composition of claim 48.

15 50. The process of claim 49 wherein said disease is a urinary tract infection.

51. The process of claim 50 wherein said urinary tract infection is caused by a bacterium.

20 52. The process of claim 51 wherein said bacterium is *Escherichia coli*.

53. The isolated protein construct of claim 1 wherein said effector portion comprises an adjuvant.

25 54. A vaccine comprising a prophylactically effective amount of the protein construct of claim 53 suspended in a pharmacologically acceptable carrier.

30 55. A process for preventing a disease comprising administering to a patient so infected a therapeutically effective amount of the composition of claim 54.

56. The process of claim 55 wherein said disease is a urinary tract infection.

57. The process of claim 56 wherein said urinary tract infection is caused
5 by a bacterium.

58. The process of claim 57 wherein said bacterium is *Escherichia coli*.

59. The protein construct of claim 1 wherein said effector portion
10 comprises a chemotherapeutic agent.

60. The protein construct of claim 59 wherein said chemotherapeutic agent is an antimicrobial agent.

61. The process of claim 59 wherein said chemotherapeutic agent is an
15 anticancer agent.

62. The protein construct of claim 1 wherein said effector portion
comprises a cytoprotective agent.

20

63. The protein construct of claim 1 wherein said effector portion
comprises an antibiotic.

64. The protein construct of claim 27 wherein said antibody is vitaxin.

25

65. The protein construct of claim 27 wherein said antibody is MEDI-493.